APPLICATION OF ERTS-A DATA TO AGRICULTURAL PRACTICES IN THE MISSISSIPPI DELTA REGION

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16. Abstract

Reports the current status of Contract NAS5-21817. To date plans for Ground Truth Monitoring have been made and equipment placed on order. A list of fields to be used for Ground Truth is being compiled.

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PREFACE

The objective of this contract is a study of the application of ERTS-A data on (1) agronomy-crops, (2) grasslands, and (3) forestry. Ground based data which is pertinent to each of these areas will be collected and reduced to computerized form by a data management team. The data management team will have the responsibility of developing data analyses for comparison of the ground based data with the ERTS-A data after spectral signature and other analyses have been performed on the ERTS-A data by NASA-MTF-ERL.

This project is organized with three phases: I. Data Management; II. Ground Truth; III. Application of ERTS Data to Potential Users.

The scope of this reporting period encompasses the first two phases.

Ground truth measurements have been determined and the appropriate equipment ordered.

Fields to be used as test plots have been tentatively identified.

The format for the ground truth data forms has been developed and a procedure for transfering the data to computer cards has been determined.

LIST OF TABLES:

INTRODUCTION

This report covers the period from November 1972 through March 1973 and describes the progress of the project during the period.

The ground truth data to be taken has been decided and the appropriate equipment has been ordered.

A tentative set of fields for the test plots has been made although the spring planting must be accomplished before a final decision is made as to which fields will be monitored. Fields to be used as test plots will include cotton, corn, rice, soybean, grass pasture, fallowed, timber, and weed infestations if such fields have in fact been planted and exist. These fields will be located near the Delta Branch Experiment Station, Stoneville, Mississippi. Adjacent commercial farms will also be monitored. A format for computerizing the ground truth data file has been developed and the ground truth data forms will be printed so as to facilitate the key punching of the data onto computer cards.

During this reporting period, several meetings of all project personnel have been called so that the project objectives could be reviewed and a plan of the work effort be made.

A trip is planned for April 1973 to the NASA-MTF-ERL to discuss the new scheduling of the data products from NASA-MTF-ERL. This meeting will be necessary due to personnel realignment at NASA-MTF-ERL.

PROJECT ORGANIZATIONS AND STATUS

The personnel involved in the project and their area of responsibility are listed below.

Dr. C. C. Baskin, Responsible for contacting the potential users of the ERTS data. Agronomy is the main area.

Dr. C. W. Bouchillon, Principal Investigator of the contract

Mr. R. W. Boyd, Responsible for data logging and initial analysis of the ERTS data.

Dr. F. M. Ingels, Responsible for coordination of effort and data management

Mr. J. S. Therrell, Responsible for contacting the potential users of the ERTS data. Forestry is the main area.

Dr. G. Tupper, Responsible for the ground truth data.

Phase I, Data Management, has been involved with the initial analysis of the ERTS-1 MSS data in photographic form and in the development of a suitable data form with which the ground truth data will be recorded and computerized. The MSU researchers receive all data from ERTS-1 (on 9.5+ positive transparencies) which covers the Mississippi Delta Area and has 30% or less cloud cover. These frames are plotted on a Mississippi map and from this, coverage of our defined test area is determined. Cloud cover and quality of data are also assessed, and the results of this analysis is recorded on a Data Analysis Sheet (copy included as Table I).

Also, a catalog search has been conducted to determine all data which ERTS-1 has taken over the Delta Area. This has been done by means of published center point co-ordinates, and the average frame size and shape of data already received over the area. This led to the analysis

table enclosed as Table II. From this type analysis we intend to determine the frequency of data loss due to clouds, system anomalies, and any other reason.

Since the Standard Catalogs have been arriving several months after the actual passes there is a considerable time delay in this analysis.

Of particular interest will be the data from March 30 and 31 as this time corresponds to a period of extensive flooding in the Delta area. Succeeding passes should provide a record of how this area drains and recovers from the massive flooding this Spring. This record should prove a source for much thought and perhaps provide a key for ideas toward prevention of such heavy loss in the event of another flood.

However to effectively study the flooding and drainage one should have daily pictures which of course are not available from ERTS.

The collection of ground truth data, for Phase II, has not yet started as the fields have not yet been planted. The ground truth data taking equipment has arrived and will be out in the fields shortly. Work in the ground truth area for this report period has centered around preliminary location of test plots, finalizing the particular variables which will be checked, and designing a computer card file data storage system. Data from the fields will be taken once every 18 days in conjunction with the satellite's passing. This will be stored on computer cards so that the statistics on a group of passes or a group of fields for the complete period can be quickly and easily calculated by the computer.

No computer generated data has been received to date from NASA-MTF-ERL. Therefore, analysis of pattern recognition capabilities has not begun. We do expect the first computer generated maps in the near future.

However, a recent realignment in personnel at NASA-MTF-ERL may provide a delay in the first computer generated maps. A trip to NASA-MTF-ERL is planned for early April to discuss the project needs.

PROGRAM FOR THE NEXT REPORTING INTERVAL

Distribution of the ground truth data forms to the personnel involved in the data logging will be accomplished.

As soon as the Delta land is dry enough to be worked spring planting will start and it is at this time that the selection of the fields to be used for test plots can be finalized. Only then will we know what crops will be monitored.

At this time it is anticipated that the Delta Branch Experiment Station personnel will log the ground truth data for the test plots in the Experiment Station and the immediately surrounding area, and the County Extension Agents will log the data from the test plots located on commercial farms in the general local.

After the initial computer generated products are available we shall be able to contact the potential users of this data and to begin the analysis of its accuracy and potential applications.

CONCLUSIONS AND RECOMMENDATIONS

At this time it is too early to speculate on the anticipated results of the project.

It is apparent that the time log between the data reception and the original pass for that data will be a problem for applications such

as flooding, disease, harvest projections. However, there will be applications such as timbered land inventory which will not require a quick turn around of the data.

Needless to say, the project personnel look forward with anticipation to the receipt of the computer maps of the area under study.

DELTA DATA ANALYSIS SHEET

PICTURE DATE	PICTURE TIME	% TEST SITE PICTURE	% TEST SITE PASS	CLOUD COVER PICTURE	CLOUD COVER SITE	COMMENTS	# OF SETS	70 MM
1035	16121	94 %	94 %	0 %	0 %	A few scan lines missing on camera 6	2	✓
	16124	0 %		10 %			2	✓
27 Aug 72								
1052	16061	0 %	91 %	10 %	0 %	About 1/3 the scan lines are missing on camera 6	1	✓
	16064	91 %		0 %			1	✓
13 Sept 72	16070	0 %		0 %			1	✓
1070	16061	0 %	88 %	0 %	0 %	A super pass!	2	✓
	16064	88 %		0 %			2	✓
1 Oct 72	16070	0 %		0 %			2	✓
1071	16120	0 %	99 %	0 %	0 %	Another super pass!	2	✓
	16122	99%		0 %			2	✓
2 Oct 72	16125	0 %		0 %			2	✓
1161	16123	11 %	95 %	0 %	0 %	A very good pass -- a few scan lines missing on camera 5	2	✓
	16130	95%		0 %			2	✓
31 Dec 72								
1178	16065	85 %	91 %	20 %	20 %	A thin layer of clouds over most of both frames makes this data of little use.	2	✓
	16072	24 %		20 %			2	✓
17 Jan 73								

TABLE I

SYNOPSIS OF ALL ERTS-1 DATA COVERING DELTA TEST SITE

DATA FROM		FRAME I.D.		CLOUD COVER		PRINCIPAL POINT		% TEST SITE	DATA RCV'D
DATE	ORBIT	DAY	TIME	PERCENT	O.K.?	N. LATITUDE	W. LONGITUDE		
8 Aug 72	222	1016	16061	100 %		34.223	89.783	31 %	
			16064	20 %	YES	32.792	90.217	88 %	
9 Aug 72	236	1017	16120	40 %		33.917	91.309	100 %	
			16123	80 %		32.494	91.740	18 %	
26 Aug 72	473	1034	16061	30 %	YES	34.506	89.709	2 %	
			16064	50 %		33.073	90.149	93 %	
27 Aug 72	487	1035	16121	0 %	YES	33.715	91.392	94 %	YES
13 Sept 72	724	1052	16064	0 %	YES	33.097	90.136	91 %	YES
14 Sept 72	738	1053		Data from This Pass Is Not Available					
1 Oct 72	975	1070	16064	0 %	YES	33.231	90.036	88 %	YES
2 Oct 72	989	1071	16122	0 %	YES	33.284	91.443	99 %	YES
19 Oct 72	1226	1088	16070	100 %		33.110	90.165	95 %	
20 Oct 72	1240	1089	16122	10 %	YES	34.596	91.163	13 %	
			16125	50 %		33.174	91.611	96 %	
6 Nov 72	1477	1106	16065	60 %		34.432	89.803	5 %	
			16072	60 %		33.017	90.233	99 %	
7 Nov 72	1491	1107	16124	60 %		34.499	91.200	25 %	
			16130	60 %		33.064	91.635	96 %	

TABLE II

DATA FROM		FRAME I.D.		CLOUD COVER		PRINCIPAL POINT		% TEST SITE	DATA RCV'D
DATE	ORBIT	DAY	TIME	PERCENT	O.K. ?	N. LATITUDE	W. LONGITUDE		
24 Nov 72	1728	1124	16073	80 %		33.116	90.171	95 %	
25 Nov 72	1742	1125	16124	90 %		34.511	91.178	23 %	
			16131	90 %		33.089	91.622	91 %	
12 Dec 72	1979	1142							
13 Dec 72	1993	1143	16125	100 %		34.463	91.201	34 %	
			16131	100 %		33.032	91.647	89 %	
30 Dec 72	2230	1160	16071	100 %		33.179	90.115	96 %	
31 Dec 72	2244	1161	16123	0 %	YES	34.558	91.151	11 %	YES
			16130	0 %	YES	33.124	91.592	95 %	YES
17 Jan 73	2481	1178	16065	20 %	YES			85 %	YES
			16072	20 %	YES			24 %	YES
18 Jan 73	2495								
4 Feb 73	2732								
5 Feb 73	2746								
22 Feb 73	2983								
23 Feb 73	2997								